United States Patent [19]

Corcoran

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[45] **Date of Patent: Nov. 5, 1991**

[54] **HIGH DENSITY STORAGE FACILITY**

[76] Inventor: **John Corcoran,** Dennis, Mass. 02638

[21] Appl. No.: **378,156**

[22] Filed: **Jul. 10, 1989**

[51] **Int. Cl.**[5] **E04H 3/04;** A47B 5/00; A47B 53/00

[52] **U.S. Cl.** **52/36;** 52/79.3

[58] **Field of Search** 52/36, 33, 33.36, 79.3; 280/79.3; 180/65.1, 65.3; 182/12, 63; 211/1.5

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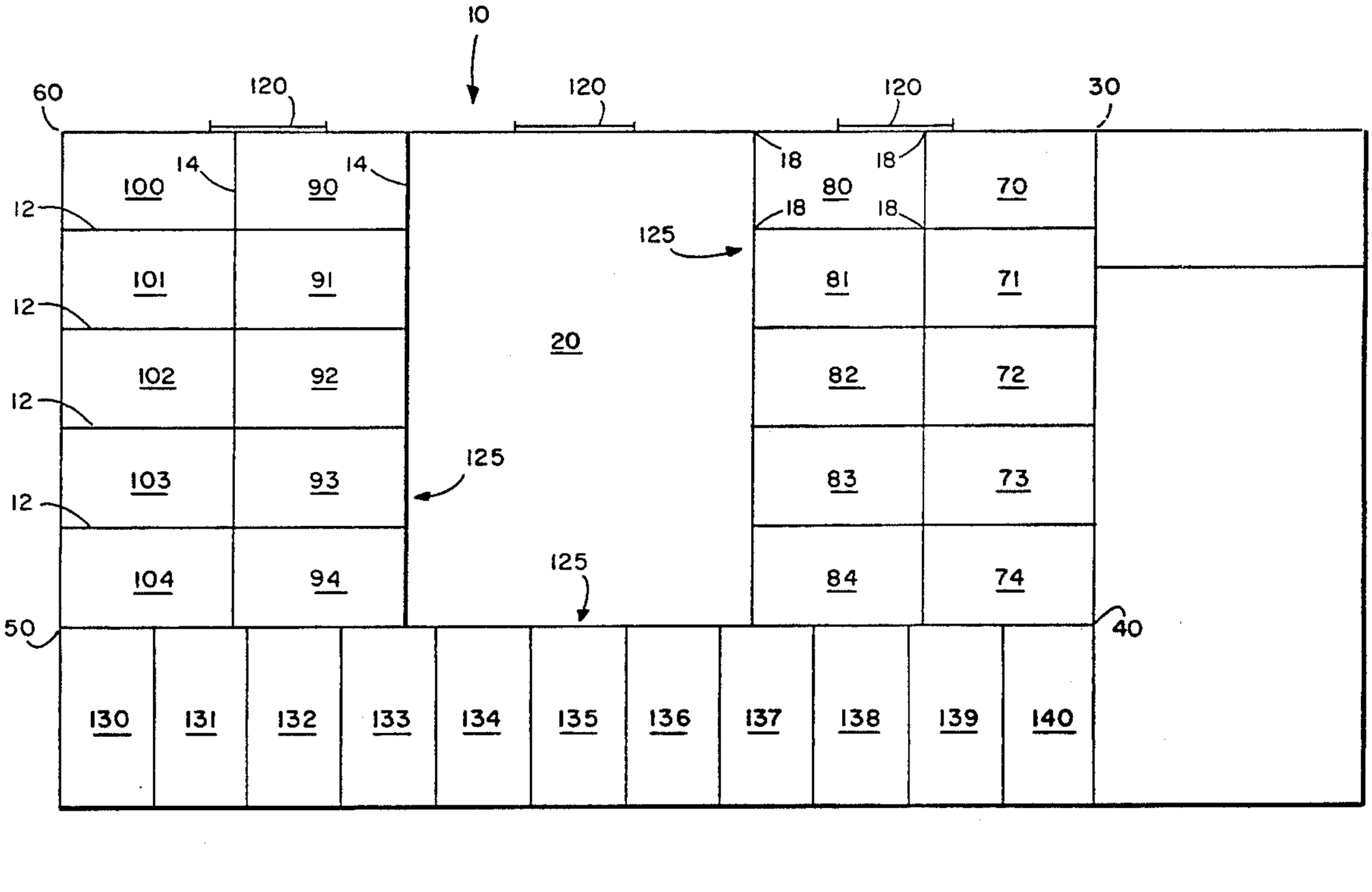
Primary Examiner—James L. Ridgill, Jr.

Attorney, Agent, or Firm—M. Lawrence Oliverio

[57] **ABSTRACT**

A high density storage facility comprising: a building enclosing a rectangular floor area of certain length and width; a plurality of rectangular storage racks of certain height divided from top to bottom into storage slots, the slots extending the rectangular length of the racks and being open and accessible for inserting and removing objects into and from the width ends of the racks; the racks being disposed within the enclosed rectangular floor area and including a mechanism for rolling the racks along the foor area; the building including a wall disposed substantially parallel to a lengthwise side of the rectangular floor area, the wall including doors selectively disposed along the length of the wall for providing access to all of the width ends of all of the racks; the racks being rollalby movable along the length of the enclosed rectangular floor areas for providing access to the width ends of the racks from the doors.

1 Claim, 12 Drawing Sheets



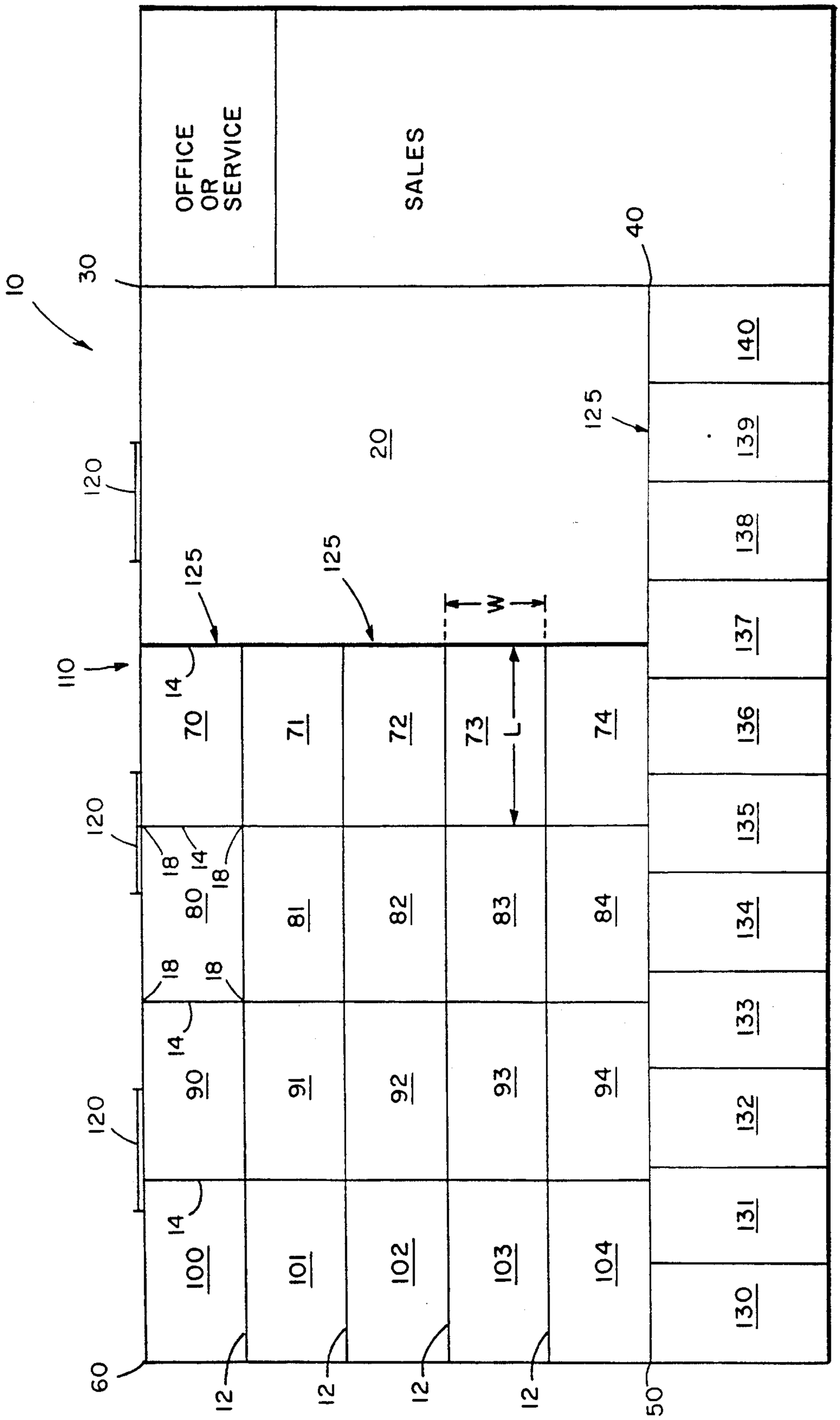

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FIG. 1

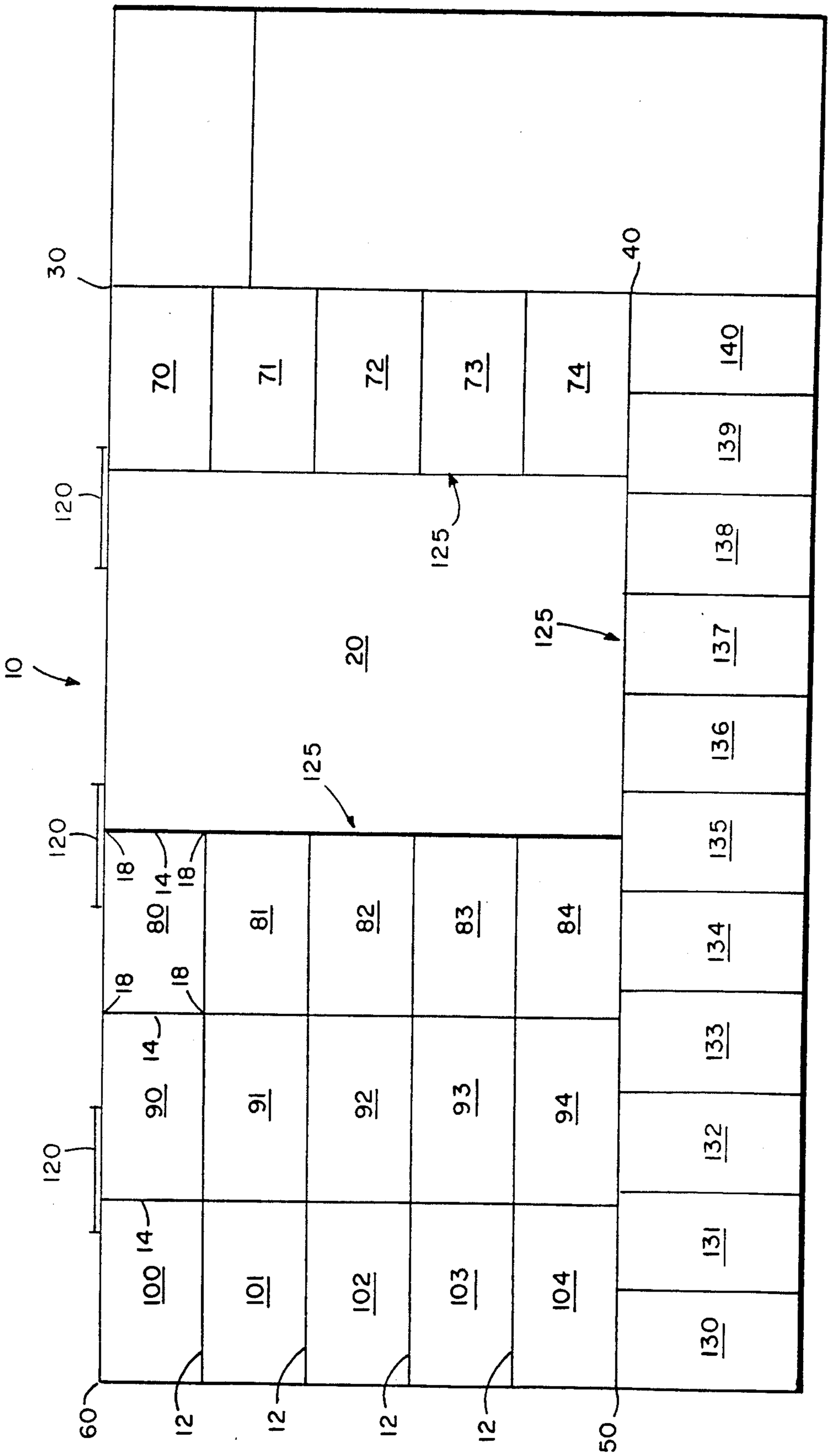
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FIG. 2

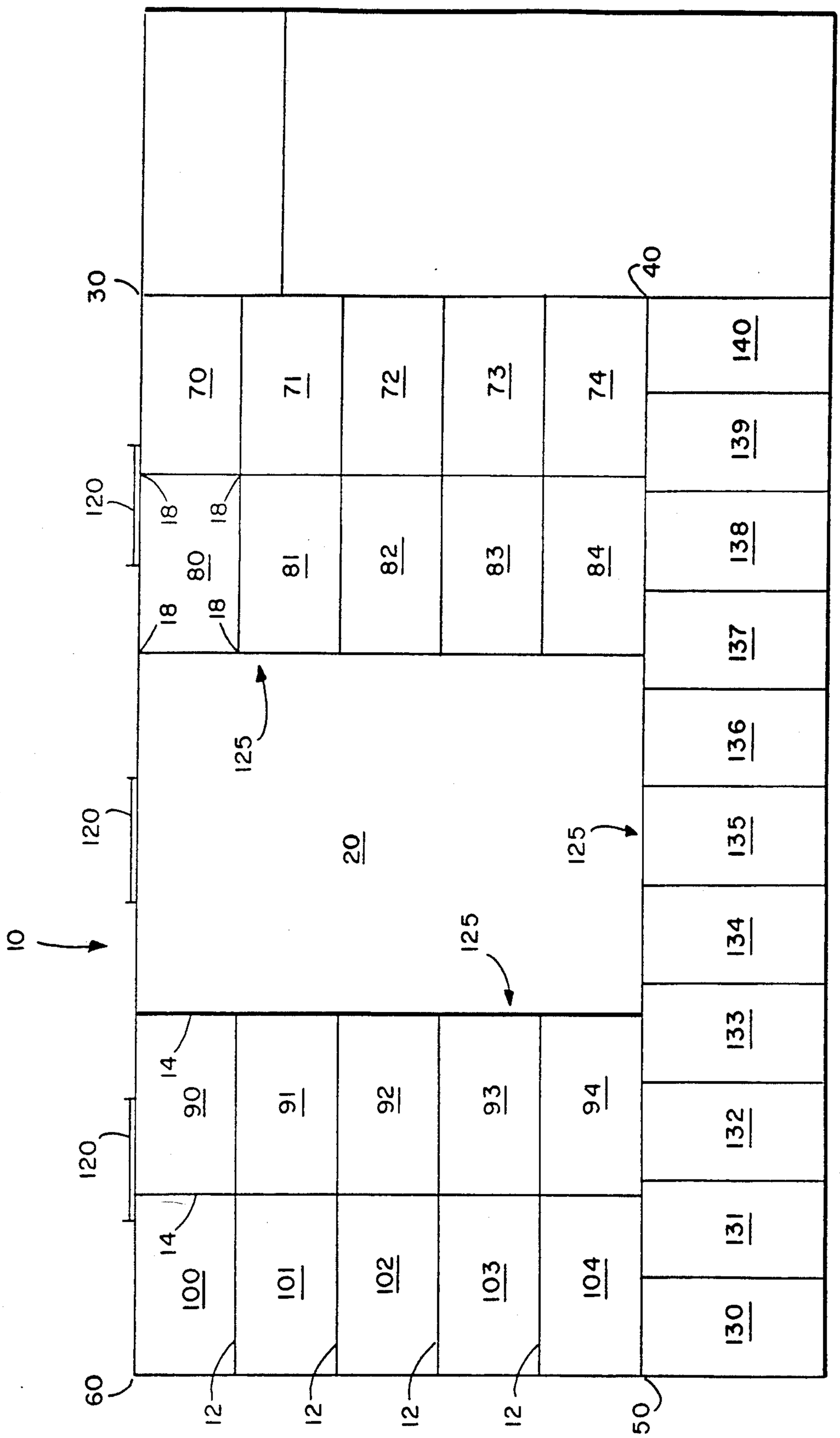
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FIG. 3

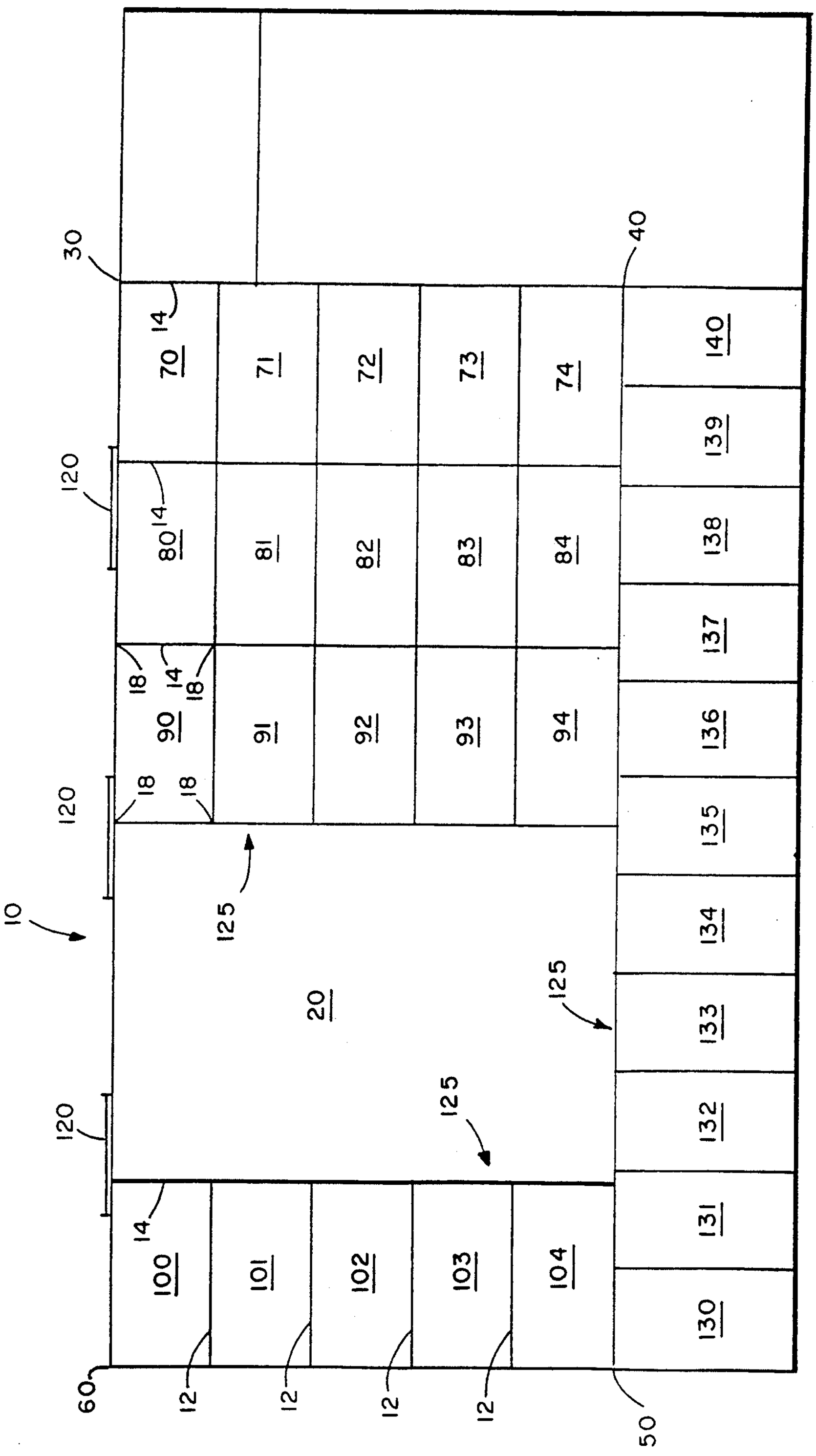
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FIG. 4

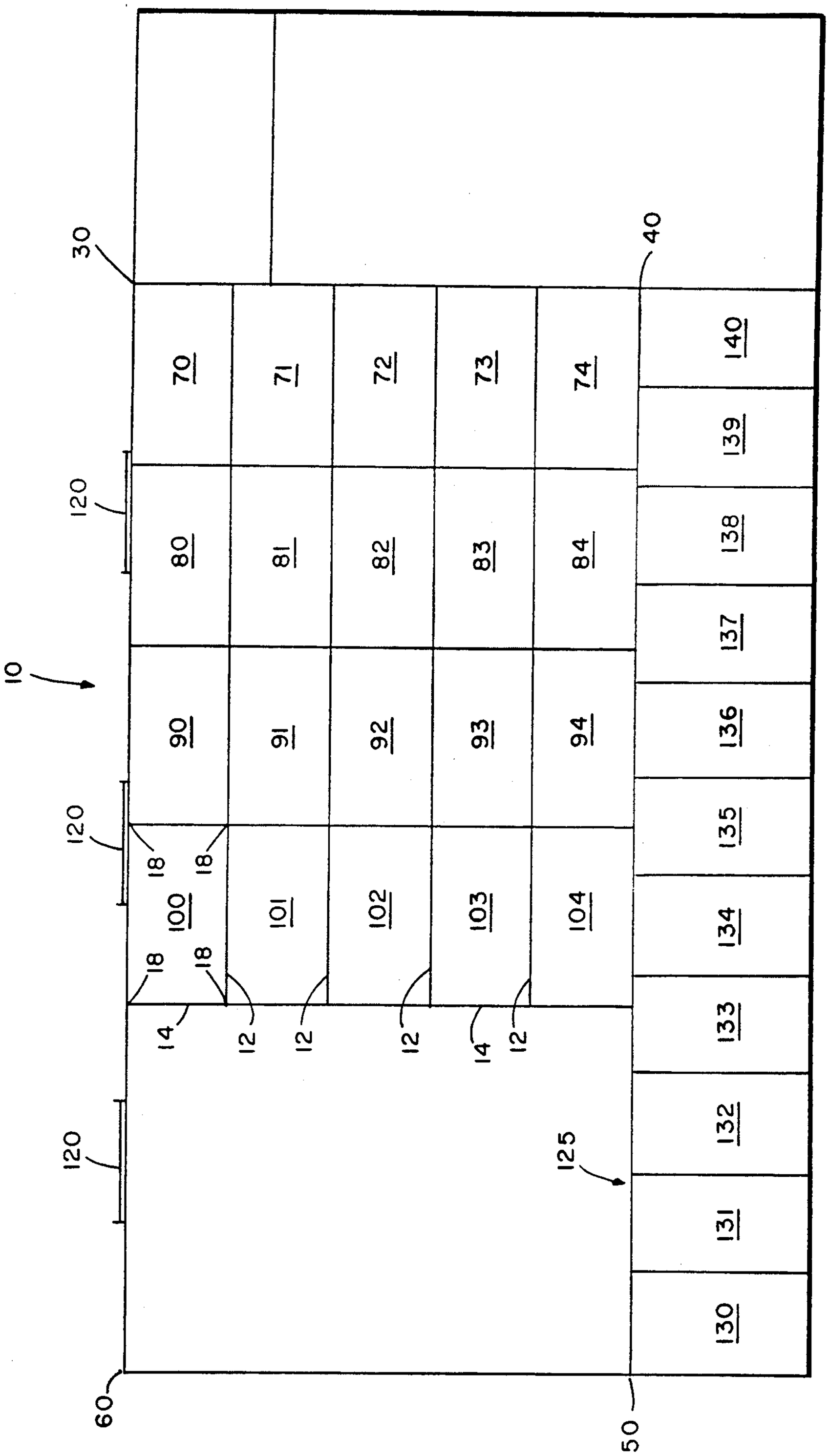
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FIG. 5

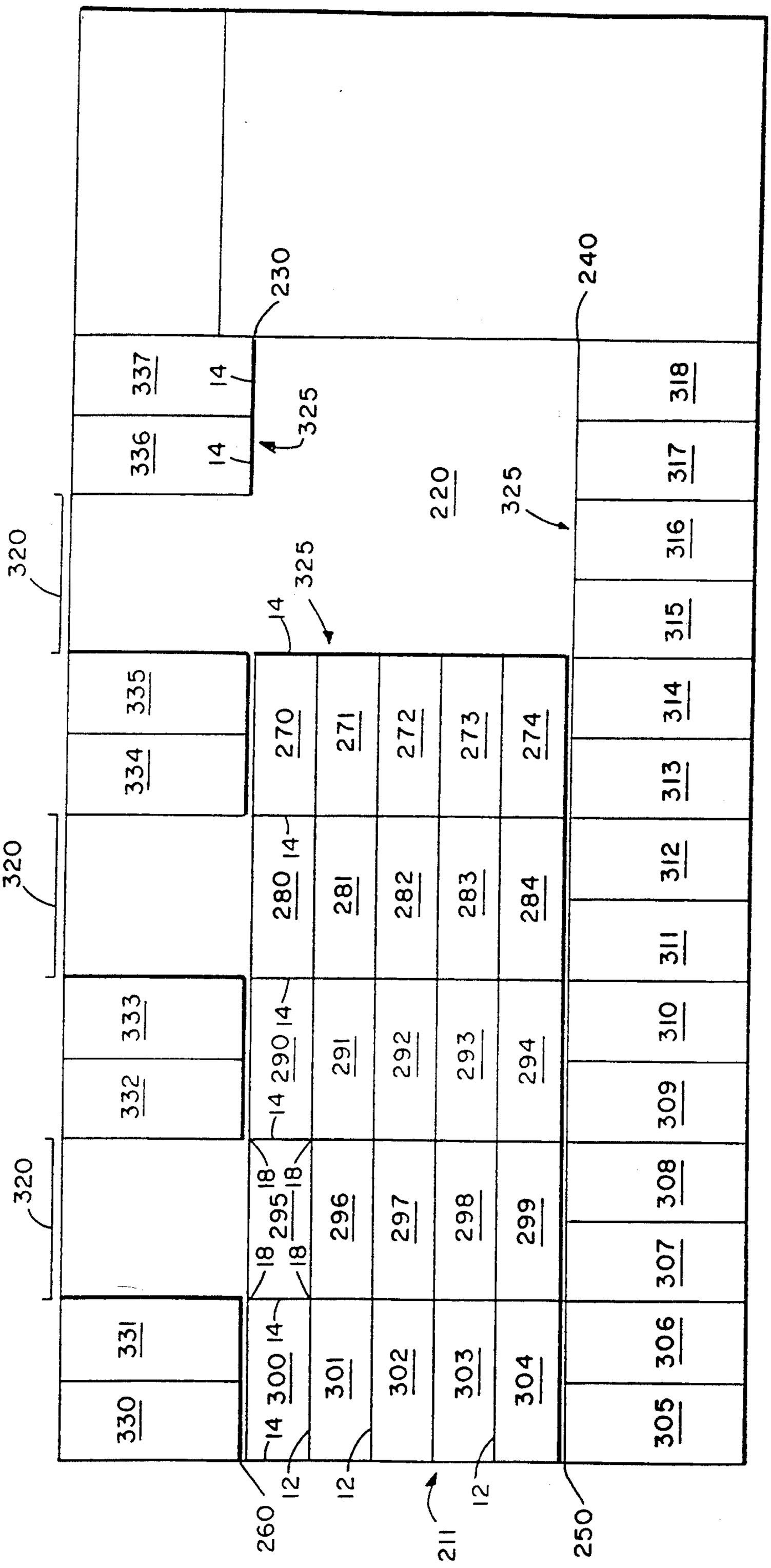
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FIG. 6

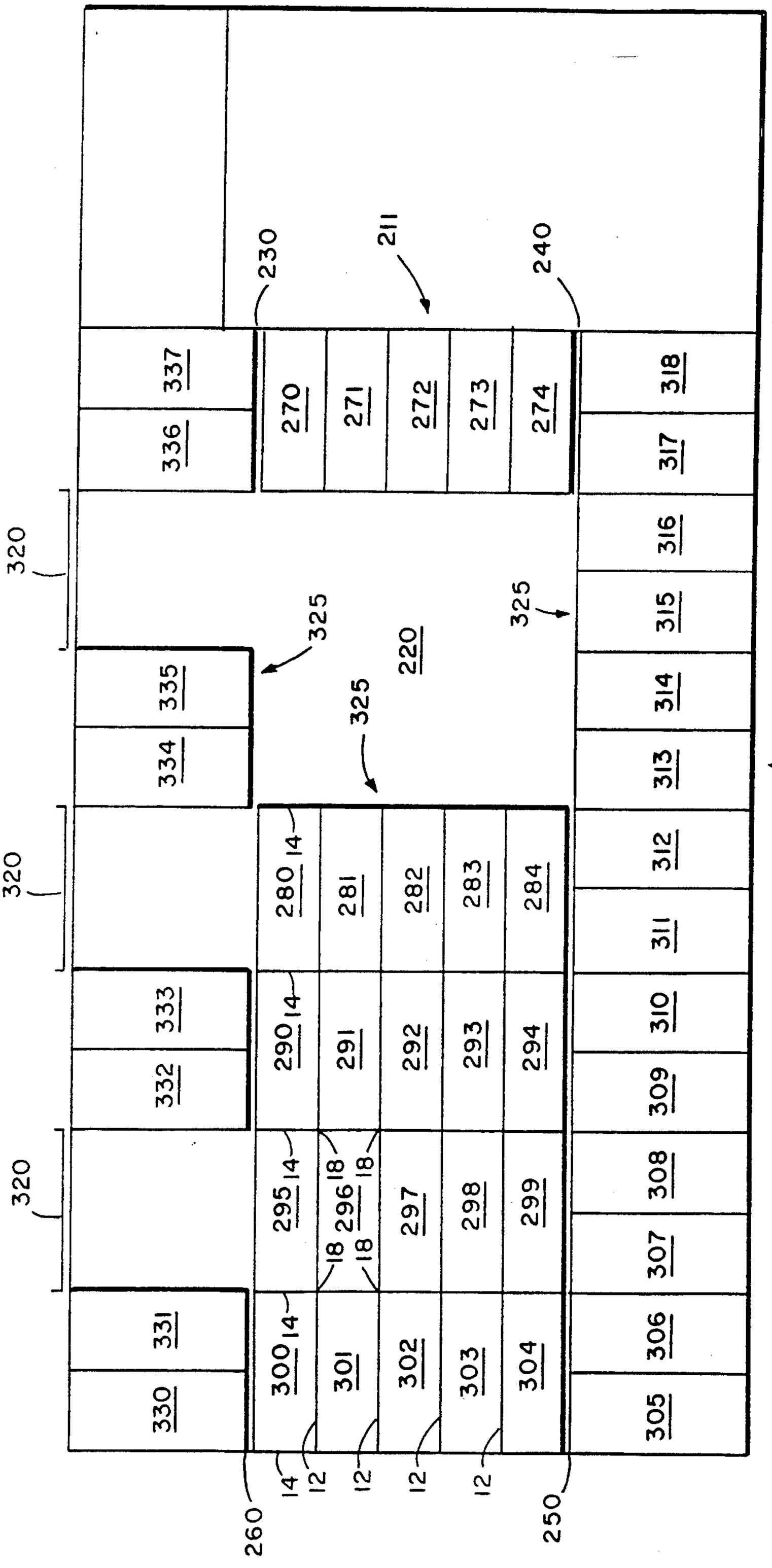
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FIG. 7

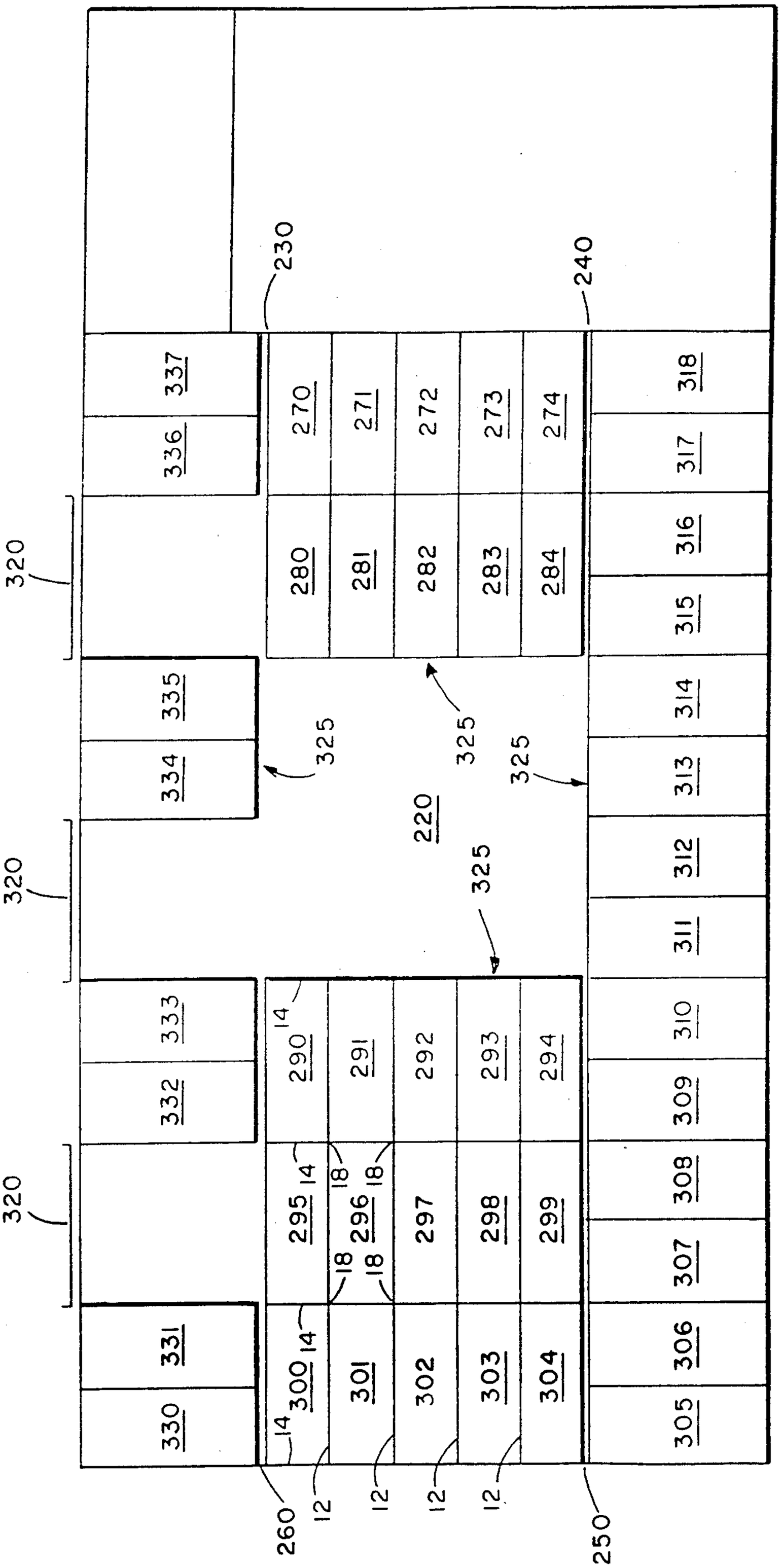
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FIG. 8

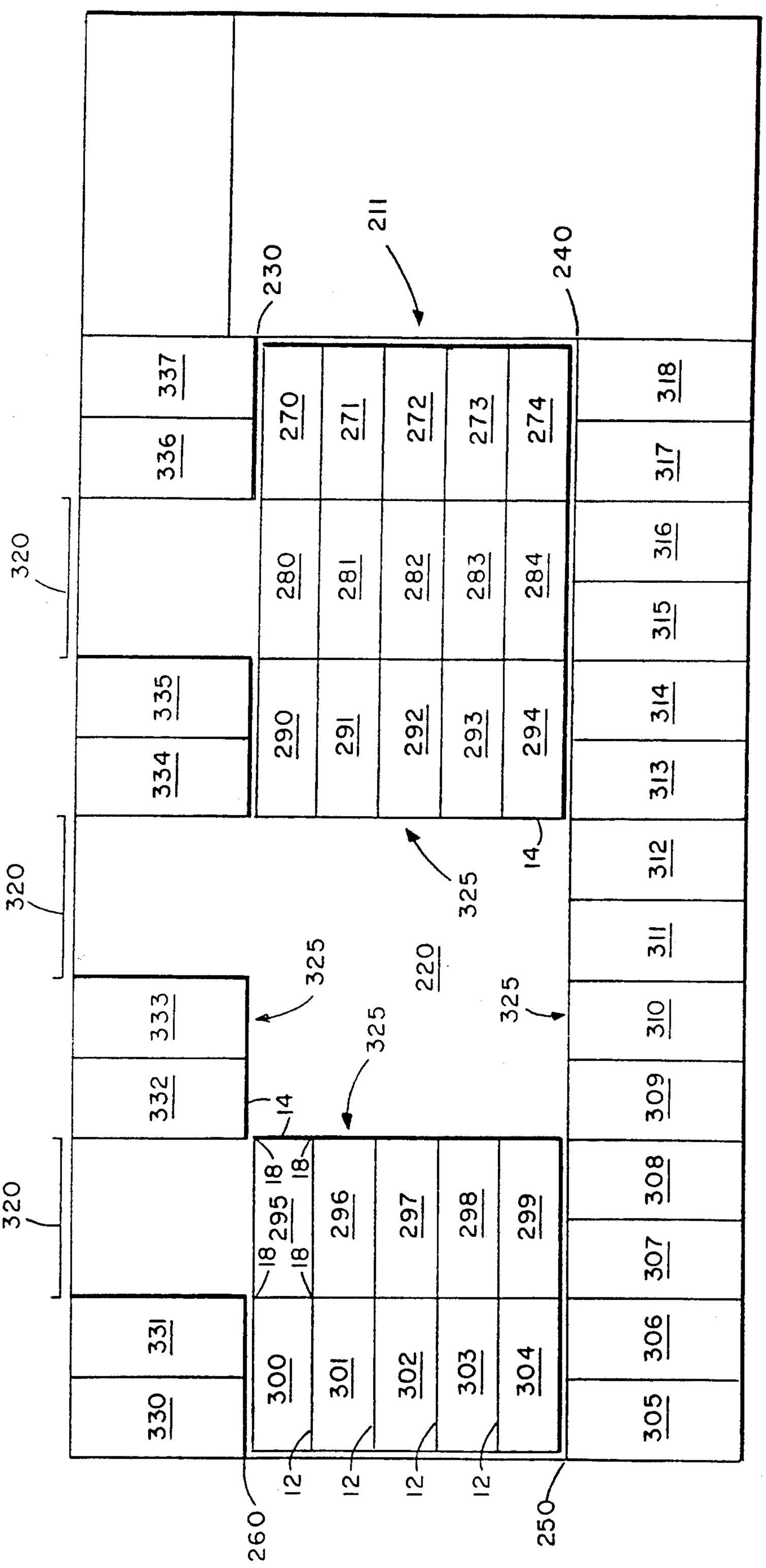
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FIG. 9

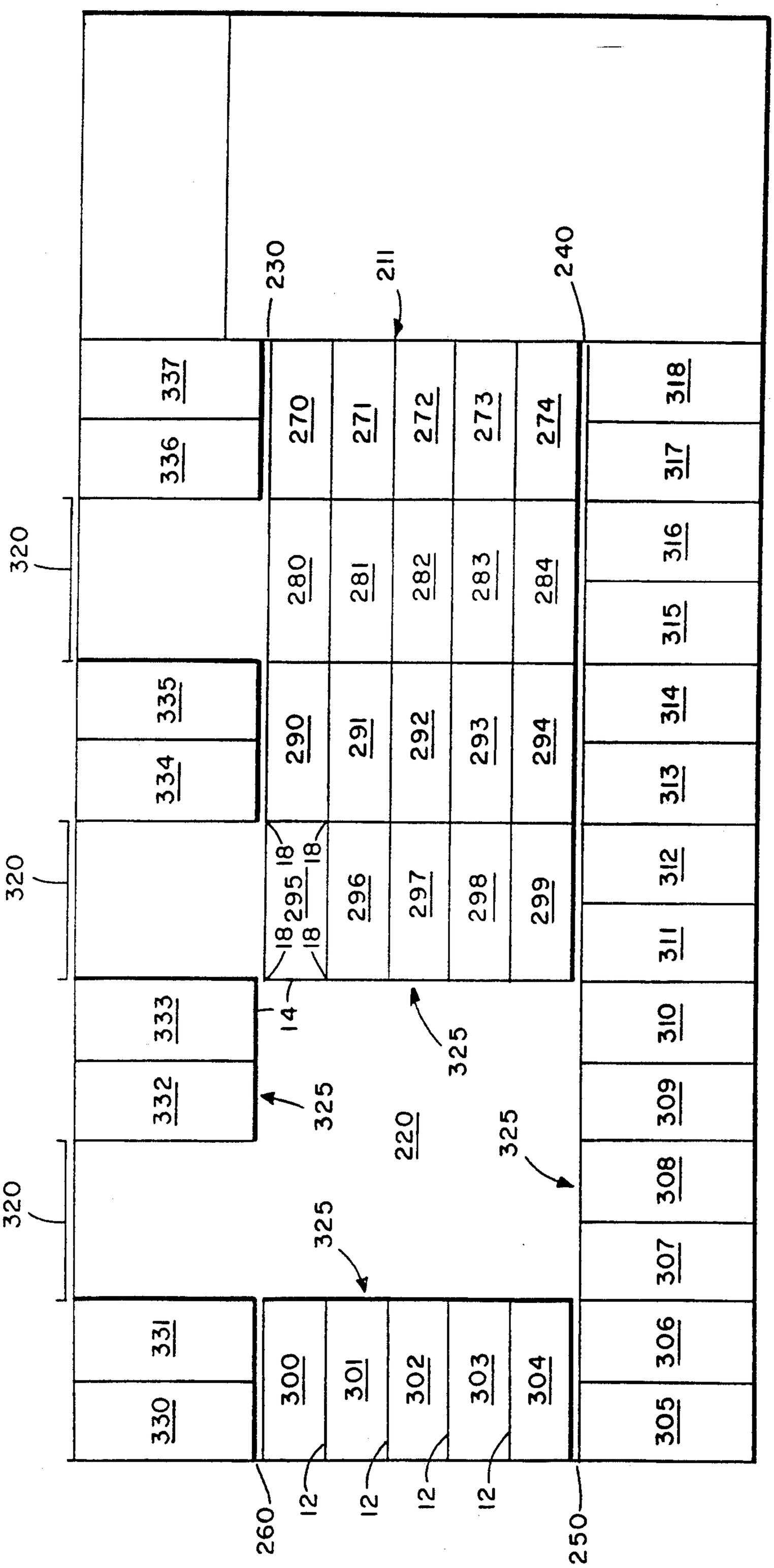
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FIG. 10

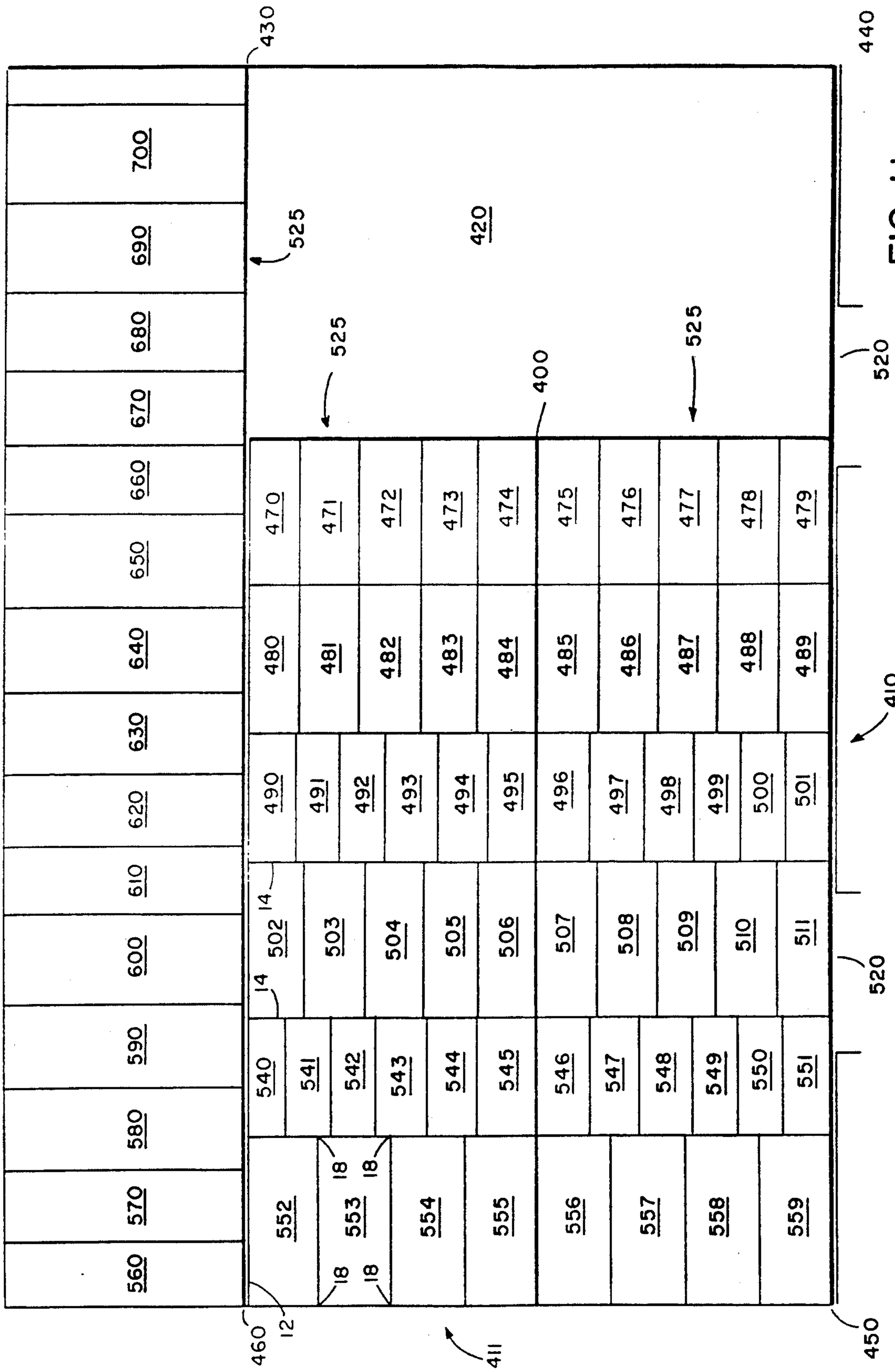
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FIG. 11

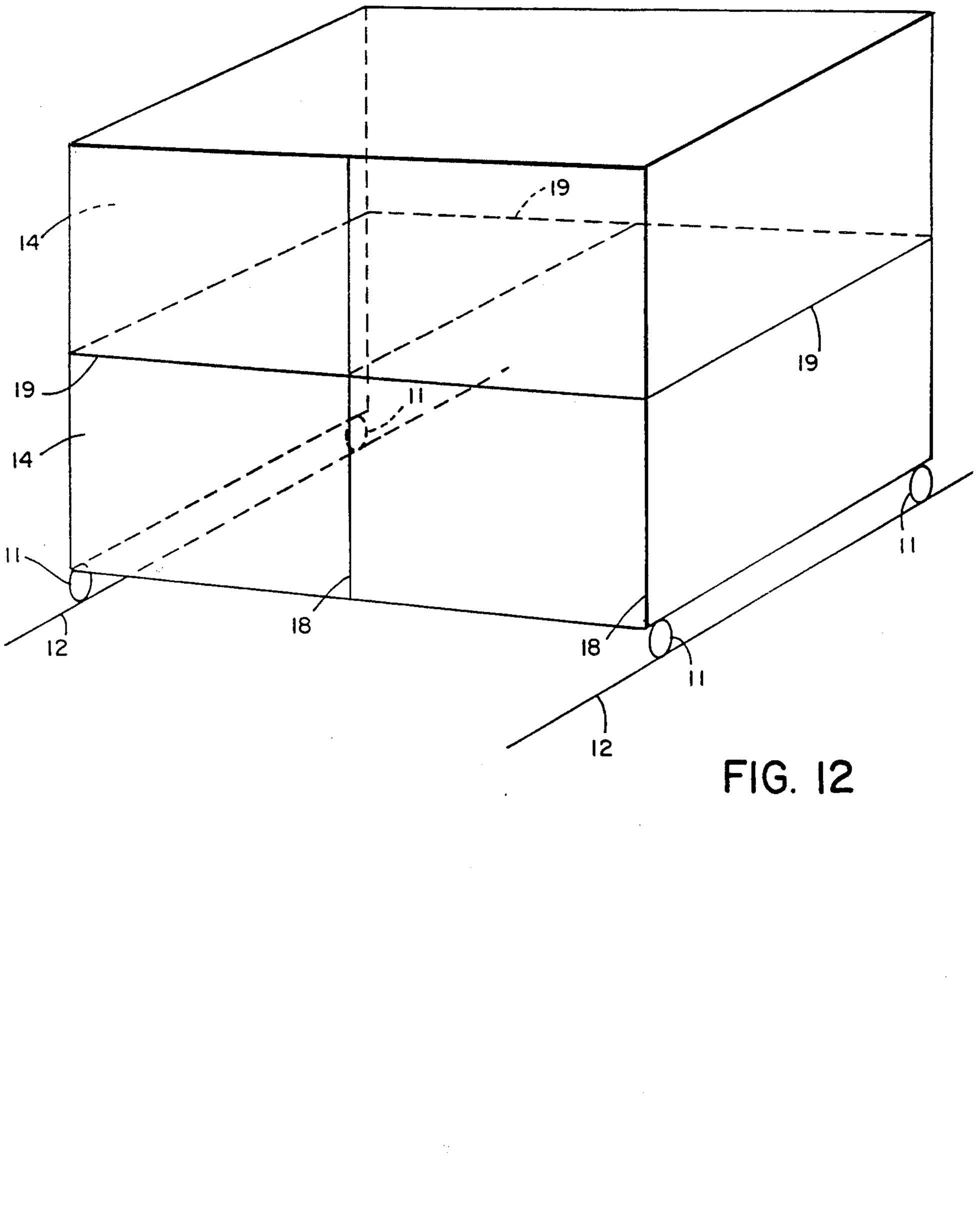

FIG. 12

HIGH DENSITY STORAGE FACILITY

BACKGROUND OF THE INVENTION

The present invention relates to high density storage facilities and more particularly to a high density storage facility for storing boats.

Despite advances in building materials and techniques, cost effective facilities for storing large sized objects such as boats, cars, furniture and the like and providing mechanisms for obtaining ready and efficient access to the stored objects have not been developed. For example with respect to boat storage, conventional facilities typically comprise an oversized building with racks aligned along the walls of the building and a large unoccupied floor space extending the length of the building. The cost of the land and construction of the building often does not justify the income which storage fees may reasonably generate.

It is therefore an object of the invention to provide a cost effective, high density storage facility which provides ready and efficient access to the space within the facility where objects may be stored.

SUMMARY OF THE INVENTION

In accordance with the invention there is provided a high density storage facility comprising a building enclosing a rectangular floor area of certain length and width; a plurality of rectangular storage racks of certain height divided from top to bottom into storage slots, the slots extending the rectangular length of the racks and being open and accessible for inserting and removing objects into and from the width ends of the racks; the racks being disposed within the enclosed rectangular floor area and including a mechanism for rolling the racks along the floor area; the building including a wall disposed substantially parallel to a lengthwise side of the rectangular floor area, the wall including doors selectively disposed along the length of the wall for providing access to all of the width ends of all of the racks; the racks being rollably movable along the length of the enclosed rectangular floor area for providing access to the width ends of the racks from the doors.

The racks are typically arranged in rows within the rectangular floor area, the lengthwise sides of the racks being arranged substantially parallel to the lengthwise sides of the rectangular floor area, the rows comprising a plurality of side by side racks which collectively fit within and across the width of the floor area. The racks comprising a row are preferably connected along their lengthwise sides forming rows which are rollably movable in a lengthwise direction along the floor area.

Most preferably the racks are mounted on tracks for lengthwise movement within the rectangular floor area, the tracks extending the length of the floor area in a direction substantially parallel to the wall of the building. Typically at least two rows of racks are disposed within the enclosed rectangular floor area and as many rows of racks are disposed within the enclosed floor area as will fit along the length of the floor area and leave a portion of the floor area unoccupied which is of a size at least sufficient to provide access from the doors to the width ends of the racks upon selective movement of the rows along the length of the floor.

The doors are selectively disposed along the wall of the building so as to provide access to the unoccupied floor area upon selective movement of one or more of the rows of racks along the length of the floor area.

Most preferably the unoccupied floor are is further selected to be of such a size as to accommodate manipulation of the objects within the unoccupied floor area for insertion into the slots. And, the unoccupied floor area is further typically selected to be of such a size as to be accessible to the doors upon movement of one or more of the rows of racks along the length of the floor area.

Most preferably, a facility according to the invention includes motor mechanisms for drivably moving the racks across the length of the floor area. The facility may include a row of stationary racks arranged along one or both of the lengthwise sides of the rectangular floor area, the stationary racks having a certain length, width and height and being divided from top to bottom into storage slots, the slots extending the length of the racks and being open and accessible from one width end for inserting and removing objects, the width ends of the racks facing the rectangular floor area.

A row of racks typically comprises a series of spaced vertical supports interconnected by a series of spaced horizontal supports. And, the horizontal supports are typically adjustable in position along the height of the vertical supports.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The following description sets forth typical embodiments of the invention, it being understood that other embodiments not specifically described herein are encompassed by the invention.

FIGS. **1–5** show the overall floor plan of a typical boat storage, service and sales facility **10**. A rectangular floor area **110** which is defined by lines connecting points **30, 40, 50, 60** is provided. For purposes of the invention discussion herein, the term rectangular also includes square.

A plurality of movable racks **70–74, 80–84, 90–94** and **100–104** are arranged as shown in rows within rectangular floor area **110**, each row comprising as many individual racks as will fit across and within the width (i.e. the distance between points **30, 40** and **50, 60**) of area **110**. As shown in FIGS. **1–5**, each row comprises as many racks (**5**) as possible as will fit within the width of area **110**, in the embodiment shown in FIGS. **1–5** (and in FIGS. **6–10** as described below) filling the entire width of the area **110** for purposes of maximum space utilization.

Each row **70–74, 80–84, 90–94**, and **100–104** of racks is movable lengthwise along the length of area **110**. The rows are typically mounted on wheels **11** which are in turn mounted in tracks **12** which extend the length of area **110**. The wheels **11** are typically mounted at the bottom of both lengthwise ends of each rack and a series of spaced parallel tracks **12** are provided along the width of the area **110** to coincide with the wheel of displacement. Each rack of each row is rectangular (in cross-section) and has a certain length L and width W. In the embodiments shown in FIGS. **1–10**, all of the racks have the same length and width, although as described in an exemplary embodiment shown in FIG. **11**, the lengths and widths of individual racks may vary within and between rows, in which event the widthwise disposition of wheels and complementary tracks **12** will not necessarily coincide with the widths of each individual rack. The tracks in any event preferably extend

the length of area **110**, i.e. between the line connecting points **50**, **60** and points **30**, **40**.

Each rack is divided into slots **14** from top to bottom. The total height of the racks is typically between about 12 and about 35 feet, the upper limit in height being somewhat dependent on local zoning restrictions concerning the height of a building in which the apparatus would reside. In a preferred embodiment of the invention each row of racks is a unitary structure comprising a series of parallel vertically oriented supports **18** connected from top to bottom by a series of parallel horizontal **19** supports. In such a preferred embodiment, conventional mechanisms are typically provided for adjusting a horizontal support **18** up and down along the vertical supports, typically in increments of about 3 inches. The vertical distance between successive horizontal supports defines the slot height and the horizontal distance between successive vertical supports **18** defines slot width.

Along one wall of the facility are disposed a series of doors **120**. An unoccupied service and loading area **20** is provided, the size of which is determined in combination with the selection of where doors **120** are disposed along the outer wall such that when a row **70–74**, **80–84**, **90–94** or **100–104** of racks is appropriately moved along the floor area **110**, enough floor area **20** is left unoccupied so as to enable the user to gain access to all of the width ends **125** of each row. As shown in FIGS. **1–5**, the unoccupied floor area **20** is large enough relative to the displacement of doors **120** so as to enable a user of the facility to always gain access to the width ends **125** of all rows by moving one or more rows sufficiently to enable a user to always gain access through a door **120** to the width ends **125** of any particular row. Objects to be stored in the slots **14** are inserted via the width ends **125** of the racks.

As shown in FIGS. **1–5** a stationary row of racks **130–140** along a wall are also typically provided to maximize storage utilization in the facility. As shown the width ends **125** of all of racks **130–140** are also accessible through at least one door **120** by appropriate movement of rows **70–74**, **80–84**, **90–94** and **100–104** along the length of area **110**.

In another exemplary embodiment of the invention shown in FIGS. **6–10**, another row of racks **330–337** may be provided along the length of the same wall of facility **210** in which doors **320** are disposed. In the same manner as described above with reference to facility **10**, FIGS. **1–5**, facility **210**, FIGS. **6–10** is provided with an unoccupied loading space **220**, successive rows of racks **270–274**, **280–284**, **290–304** which are movable along the length of an area **211** defined by lines between points **230**, **240**, **250**, **260**, and a stationary row of racks **305–318** along an outer doorless wall. As can be seen from FIGS. **6–10** the width ends **325** of all of racks **270–337** are also available by access through at least one of doors **320**. Similarly, as described with reference to the FIGS. **1–5** embodiments, the FIGS. **6–10** movable racks **270–304** all have the same length and width and the individual slots thereof are adjustable in height.

Another consideration in selecting the size of the unoccupied floor area **20**, **220**, FIGS. **1–10**, is that it must be at least large enough to allow the objects to be stored in the slots **14** of the racks to be manipulated into the width ends **125**, **325** of the racks. For example, where a facility **10**, **210** is to be used for storage of boats, typical boat lengths are from **5** to 35 feet in length and are maneuvered into an area **20**, **220** by use of a forklift. Depending on the length of the longest slot among all of the racks, the length and width of the unoccupied floor space **20**, **220** should be at least about 5–15 feet longer than the length of the longest slot **14** in order to enable a forklift to align itself parallel to the length of the racks for insertion and removal of the boat(s) into and from the width ends **125**, **325** of the racks.

In another exemplary embodiment shown in floor plan in FIG. **11**, the lengths and widths of movable racks **470–559** may vary among different movable rows provided within a facility **410**. As described with reference to FIGS. **1–10**, the facility **410**, FIG. **11**, is similarly provided with an unoccupied area **420** of at least a size sufficient to obtain access through an appropriate door **520** to all of the width ends **525** of all of the racks **470–799** upon appropriate lengthwise movement of successive rows of racks within a floor area **411** defined by lines between points **430**, **440**, **450**, **460**. As shown, the FIG. **11** facility **410** is provided with a stationary row of racks **560–700** also having varying widths aligned along a doorless wall.

In preferred embodiments of the invention the stationary rows of racks **130–140**, FIGS. **1–5**, **305–318**, **330–337**, FIGS. **6–10** and **560–700**, FIG. **11** are aligned such that their width ends **125**, **325**, **525** face the lengthwise side(s) of areas **110**, **211**, **411** and are substantially perpendicular thereto. The stationary racks are typically larger, lengthwise or widthwise or both, than the movable racks for purposes of ease of loading, unloading and storage of larger objects. Also as shown in FIGS. **1–11** the movable racks **70–104**, **270–304** and **470–559** are typically aligned such that their lengthwise dimensions are substantially parallel to the lengthwise dimension of areas **110**, **211**, **411**.

In preferred embodiments of the invention, conventional motor means are provided to drive the movable rows of racks along the lengths of areas **110**, **211**, **411**, FIGS. **1–11**. Conventional remote control means for the motor means are typically provided for access to the user outside of areas **110**, **211**, **411** typically outside such as on the outside surfaces of the walls in which access doors **120**, **320**, **520** are disposed. The user can thus drivably move the rows of racks remotely from outside areas **20**, **110**, **211**, **220**, **411**, **420**.

Typically each individual row of racks is separately drivable and the remote motor control is provided with conventional means for separately driving each row independent of another row. When the user wants to gain access to the width ends of any particular movable row or stationary rack, the user can thus separately drive individual rows to move them to appropriate positions within areas **110**, **211**, **411** whereby access to the width ends of any desired rack can be obtained. And, the user can obtain such access by remote control.

In embodiments where a facility according to the invention is to be used for boat storage, the size of the overall boat storage and service areas is at least about 5,000 square feet, the racks typically have a length of between about 5 and about 40 feet and a width of between about 5 and about 15 feet. And, a facility according to the invention is also typically housed by four walls and a roof. Areas **20**, **220**, **420** typically serve at least dual purposes for loading/unloading and for servicing a boat or other object indoors such as cleaning and repair.

It will now be apparent to those skilled in the art that other embodiments, improvements, details and uses can be made consistent with the letter and spirit of the fore-

going disclosure and within the scope of this patent, which is limited only by the following claims, construed in accordance with the patent law, including the doctrine of equivalents.

What is claimed is:

1. A high density storage facility comprising:

a building enclosing a rectangular floor area of certain length and width;

a plurality of rectangular storage racks of certain height divided from top to bottom into storage slots, the slots extending the rectangular length of the racks and being opened and accessable for inserting and removing objects into and from the width ends of the racks; the racks being disposed within the enclosed rectangular floor area and including means for rolling the racks along the floor area, the racks arranged in row within the rectangular floor area the rows of racks comprising a series of spaced vertical supports interconnected by a series of spaced horizontal supports, the lengthwise sides of the racks being arranged substantially parallel to the lengthwise sides of the rectangular floor area, the rows comprising a plurality of side by side racks which collectively fit within and across the width of the floor area, said rows rollably moveable in a lengthwise direction along the floor area;

the building including a wall disposed substantially parallel to a lengthwise side of the rectangular floor area, the wall including door means selectively disposed along the length of the wall for providing access to all of the width ends of all of the racks;

the racks being rollably moveable along the length of the enclosed rectangular floor area for providing access to the width ends of the racks from the door means, said racks disposed within the enclosed floor area sufficient to leave a portion of the floor area unoccupied which is of a size sufficient to provide access from the door means to the width ends of the racks upon selective movement of the rows along the length of the floor.

* * * * *